NAFYAD PREPARATORY SCHOOL

Model Examination **(2012/ 2013 A.Y)**

Grade 12

Subject: Chemistry

Physical constants

constants	**value**
Plank constant, h	$6.63x10^{-34}$J.s
Mass of electron	$9.11x10^{-31}$ kg
Speed of light, c	$3.00x10^{8}$ m/s
1Joule energy	$1.602x10^{-19}$ eV
Universal gas Constant, R	0.0821 L.atm/mol.K
Rydberg constant, K	2.18 $x10^{-18}$J
$K_a(CH_3COOH)$	1.8 $x10^{-5}$
Faraday constant, F	96,500C

Instructions:

- ✓ There are Eighty questions that contain four choices
- ✓ Try all the questions and choose the letter that contain the best answer then write your answer at space provided
- ✓ Each questions has one mark
- ✓ Cheating from one another should be punished and make the score zero
- ✓ Check the questions have twelve (12) pages including cover page

1. Which of the following basic physical quantity is mismatched with its SI unit?

   A. Length-meter
   B. Mass-gram
   C. Luminous intensity-Candela
   D. Time-second

2. At what temperature do the Celsius and Fahrenheit scale reading the same?

   A. 233 B. -40 C. 273 D. 298

3. In order to advance to the level of theory, hypothesis would:

   A. Be obvious accept by most people
   B. Be repeatedly confirmed by experimentation
   C. Be fully functional experiment
   D. Be report the past experience

4. Which of the following physical property is an intensive

   A. Color B. thickness C. Odour D. Conductivity

5. Which of the following statement is NOT true about Dalton's atomic theory?

   A. Atoms of different elements are different
   B. Atoms are indivisible
   C. Atoms of the same elements have different mass
   D. Atoms combine in small whole number ratio to for compounds

6. Which electromagnetic radiation can be belongs to He^{2+} ion?

   A. Beta rays B. Gamma rays C. Alpha Rays D. UV rays

7. A monoatomic ion has 13 protons and +3 charge which of the following is true?

A. It has 16 electrons
B. It has a symbol of X^{2+}
C. It has 10 electrons
D. It is isoelectronic with Ar

8. Which of the following electron transitions requires the highest energy to be absorbed by the hydrogen atom?

A. From n=1 to n=2
B. From n=2 to n=3
C. From n=3 to n=4
D. From n=4 to n=5

9. Which of the following expression shows the maximum electron of an electron in the subshell?

A. $2n^2$ B. $2\ell+1$ C. $4\ell+2$ D. n^2

10. What is the maximum number of electrons in an atom that can have the quantum number $n=4, m\ell=0?$

A. 8 B. 2 C. 16 D. 32

11. Which of the following electron configuration expressed the maximum occupation of an orbital to the electron is two.

A. Aufbua principle
B. Pauli exclusion principle
C. Hund's rule
D. Uncertainty principle

12. Which of the following types of elements are good reducing agents?

A. Halogens
B. Transition metals
C. Lanthanides
D. Alkali metals

13. Which of the following elements exists as isobar in nature?

A. ${}^{13}_{6}C$ and ${}^{14}_{6}C$
B. ${}^{14}_{6}C$ and ${}^{14}_{7}N$
C. ${}^{25}_{11}Na$ and ${}^{23}_{12}Mg$
D. ${}^{12}_{5}B$ and ${}^{13}_{6}C$

14. Which of the following assumption about atomic structure of Thomson, Rutherford and Bohr is common for all?

A. Atoms are mostly composed of empty space
B. All matter is composed of atoms
C. Atoms are composed f an electrons and protons
D. Electron orbit the nucleus of an atom at a distinct energy level

15. The energy of a photon having a frequency of $4.5x10^{9}$ MHz is

A. 2.8×10^{-18}J
B. 2.8×10^{-19}J
C. 2.8×10^{-25}J
D. 28.35×10^{-18}J

16. Four elements A, B, C, d have atomic number z-1, z, z+1 and z+2 respectively. If z=10 the bond between which pair of elements will be form ionic?

A. B and C
B. A and C
C. B and D
D. C and D

17. All of the following are their characteristics of most ionic compounds in the solid state. EXCEPT

A. High melting point
B. Solubility in water
C. High electrical conductivity
D. Insolubility in organic solvent

18. How many bonding pairs and lone pairs respectively on the central atom of BrF_4^-?

A. 3, 2
B. 5, 1
C. 4, 2
D. 4, 1

19. Which f the following compounds has no resonance structure?

A. HNO_3
B. CO_3^{2-}
C. SO_2
D. NH_3

20. Which of the following molecule has a Lewis structure that does not obey the octet rule?

A. CO_2 B. CS_2 C. SF_6

D. HCN

21. All of the following when added to water will produce electric solution. EXCEPT

A. $N_2(g)$ B. NaCl(s) C. HCl(g) D. KOH(s)

22. Which of the following species has the smallest H-X-H bond angle when X is the central atom?

A. H_2O B. BH_3 C. NH_3 D. CH_4

23. Which of the following likely to have the largest London dispersion forces?

A. F_2 B. Cl_2 C. Br_2 D. I_2

24. How many atomic orbitals are required for sp^3d hybridization?

A. 3 B. 2 C. 4 D. 5

25. Which of the following doesn't exist? (atomic number: $_2$He, $_3$Li, $_1$H, $_9$F)

A. He_2 B. Li_2 C. H_2 D. F_2

26. Which of the following is true about the crystalline solids?

A. They melt over a range of temperature

B. They have no well-defined shape

C. They break and give regular faces

D. None of the above

27. Which of the following molecule has the shortest bond length? (O=8, N= 7)

A. O_2 B. N_2 C. H_2 D. F_2

28. The most important reason for bond formation is

A. Noble gas electron configuration

B. Electrostatic attraction

C. Lowering of energy

D. Electron pair sharing

29. Among the following pair of molecules which expected to exhibit hydrogen bonding?

A. CH_3OH and C_6H_6
B. CH_3NH_2 and H_2O
C. CH_3CH_3 and NH_3
D. CCl_4 and CS_2

30. The structure of SiF_4 is

A. Trigonal planar
B. Tetrahedral
C. Trigonal pyramidal
D. Square planar

31. All of the following have the same molecular shape. EXCEPT

A. $CHCl_3$ B. CH_4 C. PCl_3 D. PH_4^+

32. How many lone pairs of electrons are there on the central atom in SF_4?

A. 0 B. 1 C. 2 D. 3

33. For the given reaction $N_2 + 3H_2 \rightarrow 2NH_3$, the rate of appearance of NH_3 is $1.2\times10^{-2} molL^{-1}s^{-1}$. What is the rate of disappearance of H_2?

A. $-1.2\times10^{-2} molL^{-1}s^{-1}$
B. $-6.0\times10^{-2} molL^{-1}s^{-1}$
C. $1.2\times10^{-2} molL^{-1}s^{-1}$
D. $6.0\times10^{-2} molL^{-1}s^{-1}$

34. How does the catalyst increase the rate of a chemical reaction?

A. By shifting the equilibrium to the right
B. By lowering activation energy
C. By shifting the equilibrium to the left
D. By increasing activation energy

35. Rate law for a reaction $A + B \rightarrow P$ is found to be $Rate = k[A][B]$. If the concentration of "A" is doubled, keeping the concentration of "B" constant. What is the value of the rate constant?

A. The same
B. Halved
C. Quadrupled
D. Doubled

For the reaction $2Q+R \rightarrow 2P$ the following data were obtained: Based on the given data answer questions from 36-38

Experiments	$[Q]_o$(mol/L)	$[R]_o$(mol/L)	$(Rate)_o$ (mol/L)
1	0.5	0.5	10
2	0.5	1.0	20
3	0.5	1.5	30
4	1.0	0.5	40

36. The rate law from the above experimental data is expressed as

A. $Rate=k[Q]^2[R]$

B. $Rate=k[Q][R]^2$

C. $Rate=k[Q][R]$

D. $Rate=k[R]^2$

37. The order of the reaction of the above experimental data is

A. 0 B. 1 C. 2 D. 3

38. The value of the rate constant from the experimental data is

A. 80 B. 40 C. 20 D. 10

39. Which of the following unit of rate constant shows as the zero order reaction?

A. $L^2mol^{-2}s^{-1}$

B. $Lmol^{-1}s^{-1}$

C. s^{-1}

D. $molL^{-1}s^{-1}$

40. If the rate constant for the first order reaction $SO_2Cl_2(g) \rightarrow SO_2(g)+Cl_2(g)$ is $2.2\times10^{-5}s^{-1}$. What is the half-life of the reaction if the initial concentration of SO_2Cl_2 is 1M?

A. 1.35×10^4sec

B. 3.15×10^4sec

C. 1.58×10^4sec

D. 5.18×10^4sec

41. Which of the following correctly describes a chemical reaction at equilibrium?

A. The concentration of reactants and products are equal

B. The change in concentration of reactants and products is constant

C. The rate of forward reaction is less than the rate of reverse reaction

D. The rate of forward reaction is greater than the rate of reverse reaction

42. For the reaction $CaCO_3(s) \leftrightarrow CaO(s) + CO_2(g)$ K_P is equal to:

A. K_C B. $K_C RT$ C. $K_C(RT)^2$ D. $K_C(RT)^{-1}$

43. Which of the following equilibrium reaction has equal K_C and K_P value?

A. $N_2(g) + 3H_2(g) \leftrightarrow 2NH_3$

B. $2SO_3(g) \leftrightarrow 2SO_2(g) + O_2(g)$

C. $MgCO_3(s) \leftrightarrow MgO(s) + CO_2(g)$

D. $2CO_2(g) + H_2O(g) \leftrightarrow 2O_2(g) + CH_2CO(g)$

44. At 298K the following two gaseous equilibrium involving SO_2, SO_3 and O_2 are established as follows: $SO_2(g) + \frac{1}{2}O_2(g) \leftrightarrow SO_3(g)$ and its K value is equal to $K_1 = 4 \times 10^3$ then what is the value of K_2 for the reaction $2SO_3(g) \leftrightarrow 2SO_2(g) + O_2(g)$

A. 4.0×10^3

B. 1.6×10^7

C. 6.25×10^{-8}

D. 2.5×10^{-4}

45. Which change will increase the amount of SO_3(g) at the equilibrium: $2SO_2(g) + O_2(g) \leftrightarrow 2SO_3(g), \Delta H = -197 KJ$

i. Decreasing temperature

ii. Increasing volume

iii. Increasing pressure

A. i only B. ii only C. i and ii only D. i and iii only

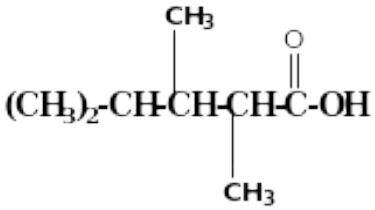
46. Which of the following factors does not affect the position of chemical equilibrium?

A. Temperature B. Concentration C. Catalysts D. Pressure

47. Parts of a compound that determines its physical and chemical property is

A. Structural formula
B. Functional group
C. General formula
D. Isomers

48. What is the IUPAC name for the following carboxylic acid?



A. 2, 3-dimethylhexanoic acid
B. 2, 4-dimethylhexanoic acid
C. 2, 3, 4-trimethylpentanoic acid
D. 2, 3, 4- trimethyl-5-pentanoic acid

49. Hydrolysis of ester leads to the formation of which products in acidic medium?

A. Ether and Alcohol
B. Aldehyde and Ketones
C. Alcohol and Carboxylic acid
D. Alcohol and carboxylate salt

50. Which of the following state exists at low temperature and high pressure?

A. $H_2O(\ell)$ B. $H_2O(s)$ C. $H_2O(g)$ D. None of the above

51. The number of phase(s) in a mixture of CH_4, C_2H_6 and C_3H_8 are

A. 1 B. 2 C. 3 D. 4

52. Which of the following is not true about the physical properties of carboxylic acids?

A. Lower members carboxylic acids are liquid
B. They have higher boiling point than oxygen derivative hydrocarbons
C. Lower members of carboxylic acids are nonvolatile
D. Higher members of aliphatic and aromatic carboxylic acids are waxy

53. The conversion of ester into alcohols and carboxylic acid is

A. Esterification
B. Saponification
C. Dehydration
D. Hydrolysis

54. Which of the following types of solution is not solid-liquid solution?

A. Sodium chloride solution
B. Iodine in Acetone
C. Benzene in Carbon tetrachloride
D. $CuSO_4$ in water

55. A solution at equilibrium that contain the maximum amount of dissolved solute at a given temperature is

A. Supersaturated solution
B. Saturated solution
C. Unsaturated solution
D. None of the above

56. What is the mole fraction of Methanol in the mixtures of 16g CH_3OH and 54g of H_2O?

A. 0.86 B. 0.68 C. 0.50 D. 0.14

57. The equivalent mass of H_3PO_4 based on the reaction $H_3PO_4 + 3NaOH \rightarrow Na_3PO_4 + 3H_2O$ is

A. 98 g/eq B. 49 g/eq C. 32.7 g/eq
D. 24.5 g/eq

58. What would be the boiling point of 4m common salt (NaCl) in water at 1atm. (K_b for H_2O=0.512 ^OC/m, T_b^O = 100^OC)

A. 102.048 ^OC B. 100.512 ^OC C. 98.952 ^OC
D. 100 ^OC

59. What is the molecular mass of solute B, if the osmotic pressure of the solution contains 20 g/L is 760 torr at 127^OC?

A. 656.8 g/mol B. 0.864 g/mol C. 208.5 g/mol D. 0.274 g/mol

60. If the solute-solvent interactions are greater than the solute-solute and solvent-solvent interactions, what will be the total vapor pressure of the solution?

A. Greater than that of calculated from Raoult's law
B. Less than that of calculated from Raoult's law
C. The same as that of calculated from Raoult's law
D. Raoult's law cannot be applied for such type of calculation

61. A solution which has a pH value of 3 is

A. Basic solution
B. Has hydrogen ion concentration 10^3
C. Hydroxide ion concentration 10^{-11}
D. Neutral solution

62. The P^{ka} values of three acids A, B, C are 5.5, 4.5 and 6.5 respectively. Which of the following represents the correct order of acid strength?

A. B > A > C
B. A > B > C
C. C > A > B
D. B > C > A

63. In which direction will the following equilibrium shift, if a solution of CH_3COONa is added to $CH_3COOH(aq) \leftrightarrow CH_3COO^-(aq) + H^+(aq)$

A. The equilibrium shift to the right (more products)
B. No change
C. The equilibrium shift to the left (more reactants)
D. Can't be predicted

64. Each of the following act as both a Bronsted acid and Bronsted base. EXCEPT

A. HCO_{3^-} B. NH_{4^+} C. $H_2PO_{4^-}$ D. H_2O

65. A 0.1M solution of NaOH is dissolved in water. What species of ions are present and their concentration at equilibrium?

A. $[H_3O^+] = 0.1M, [OH^-] = 0.1M, [Na^+] = 0.1M$
C. $[H_3O^+] = 0.1M, [OH^-] = 10^{-13}M, [Na^+] = 0.1M$
B. $[H_3O^+] = 10^{-13}M, [OH^-] = 0.1M, [Na^+] = 0.1M$
D. $[H_3O^+] = 10^{-7}M, [OH^-] = 10^{-7}M, [Na^+] = 0.1M$

66. The pH of the solution that contain a 0.1M CH_3COOH and 0.5M CH_3COONa is (given: log3.6=0.556)

A. 5.44 B. 5.82 C. 4.76
D. 9.24

67. What is the thermodynamics system that exchange only energy with its surrounding?

A. Adiabatic B. Isolated C. Closed D. Open

68. A system that absorbed 300KJ heat from the surrounding and does 650KJ work. What is its change of internal energy of the system?

A. 950KJ B. 350KJ C. -950KJ D. -350KJ

69. The entropy of the universe always increases and tends toward a maximum. This statement is

A. Zeroth law of thermodynamics
B. Third law of thermodynamics
C. First law of thermodynamics
D. Second law of thermodynamics

70. Which of the following Reaction has the positive entropy?

A. $2CO(g)+O_2(g)\rightarrow 2CO_2(g)$

B. $4NH_3(g)+3O_2(g)\rightarrow 2N_2(g)+6H2O(\ell)$

C. $2NaCO_3(s)\rightarrow Na_2CO_3(s)+CO_2(g)+H2O(\ell)$

D. $2H_2(g)+O_2(g)\rightarrow 2H_2O(\ell)$

71. Considering the basic concepts of thermodynamics which of the following alternatives contain criteria spontaneous process?

$I.\Delta G_{system}<0$
$II.\Delta S_{Universe}>0$
$III.\Delta H_{system}>0$

A. I only B. II only C. I and II only D. II and II only

72. Estimate ΔH for the gas phase reaction: $CO(g)+H_2O(g)\rightarrow H_2(g)+CO_2(g)$

Bond	**Bond Energy (KJ/mol)**
C≡O	1072
O-H	463
H-H	436
C=O	799

A. 136KJ B. -36KJ C. -136KJ D. 36KJ

73. The oxidation state of Carbon in $H_2C_2O_4$ is

A. +2 B. +3 C. +4 D. +6

74. The process of causing a non-spontaneous chemical reaction to take place by means of electrical energy is called

A. Cell potential
B. Electrochemistry
C. Electrolysis
D. Galvanization

75. Given the standard reduction potential:

$E^{O}_{Zn^{2+}/Zn} = -0.76V, E^{O}_{Cu^{2+}/Cu} = +0.34V$
$E^{O}_{Sn^{2+}/Sn} = -0.14V, E^{O}_{Ni^{2+}/Ni} = -0.26V$

Based on the above information the most difficult to be oxidized species is

A. Cu B. Zn C. Sn D. Ni

76. Calculate the standard cell potential and ΔG^{O} for the reaction at 25^{O}C of

$2Al^{3+}(1M) + 3Mg(s) \Leftrightarrow 2Al(s) + 3Mg^{2+}(2M)$ and $E^{O}_{Al^{3+}/Al} = -1.66V, E^{O}_{Mg^{2+}/Mg} = -2.37V$

A. 0.71V, -411KJ
B. -0.71V, 411KJ
C. 0.71V, -137KJ
D. -0.71V, 137KJ

77. Which of the following reaction cannot involve in contact process in the production of sulfuric acid?

A. $S + O_2 \rightarrow SO_2$
B. $2SO_2 + O_2 \rightarrow 2SO_3$
C. $SO_3 + H_2SO_4 \rightarrow H_2S_2O_7$
D. $SO_3 + H_2O \rightarrow H_2SO_4$

78. Which of the following is mismatched with its production process?

A. Na_2CO_3-Solvay process
B. NH_3-Haber process
C. HNO_3-Frash process
D. H_2SO_4-Contact process

79. What type of polymerization occurs when amino acids reacts to form peptides and proteins?

A. Addition polymerization
B. Condensation polymerization
C. Substitution polymerization
D. Hydration polymerization

80. Which of the following is a natural polymer?

A. Perspex B. PVC C, Teflon D. Protein